CLAIMS

What is claimed is:

1. A separation system comprising:

a cathode, an anode, and a first ion bound by a first ion exchange resin, the first ion exchange resin being at least partially disposed between the cathode and the anode and separated from at least one of the anode and cathode by a charge mosaic membrane;

wherein the cathode, the anode, and the ion exchange resin are at least partially disposed in a medium; and

wherein the first ion is eluted from the resin using (a) a voltage that is applied between the anode and cathode and (b) a second ion that is generated by electrolysis of the medium.

2. The separation system of claim 1 wherein the first ion is an anion, the first ion exchange resin is an anion exchange resin that is separated from the cathode by the charge mosaic membrane, and wherein the second ion is a hydroxyl ion.

3. The separation system of claim 2 wherein the medium comprises water.

4. The separation system of claim 3 wherein the second ion reacts with an H^+ ion generated at the anode to form water.

5. The separation system of claim 1 further comprising a second ion exchange resin at least partially disposed between the anode and the first ion exchange resin.

6. The separation system of claim 5 further comprising a cation exchange membrane at least partially disposed between the first and second ion exchange resin.

7. The separation system of claim 6 wherein the charge mosaic membrane is at least partially disposed between the cathode and the first ion exchange resin.

8. A separation system comprising an ion exchange resin that binds an ion from a fluid, wherein the ion is eluted from the resin using (a) an electric field generated between an cathode and a anode and (b) a second ion that is generated by electrolysis of the fluid by the cathode and the anode.

9. The separation system of claim 8 wherein a charge mosaic membrane separates the ion exchange resin from the cathode, thereby allowing migration of OH^- ions from the cathode to the ion exchange resin and migration of cations from the ion exchange resin to the cathode.

10. The separation system of claim 9 wherein elution of the ion from the fluid further comprises addition of a third ion.

11. The separation system of claim 8 wherein the ion exchange resin comprises an anion exchange resin, and wherein the ion is an anion.

12. The separation system of claim 8 wherein the fluid comprises a biological fluid and wherein the ion comprises at least one of a polynucleotide, a polypeptide, a charged lipid, and a charged carbohydrate.

13. The separation system of claim 8 further comprising a third ion that binds to the ion exchange resin, wherein the third ion elutes at an electric field and concentration of the second ion that is different from the elution of the ion from the fluid.

14. A separation system comprising a charge mosaic membrane coupled to an ion exchange resin that binds an ion from a fluid and wherein the ion is eluted at least in part from the resin using an eluent that is generated by electrolysis of the fluid.

15. The separation system of claim 14 wherein the resin comprises an anion ion exchange resin, and wherein the eluent is an OH^- ion.

16. The separation system of claim 14 wherein electrolysis is performed by a current applied to an anode and a cathode, wherein the anode and the cathode are at least

partially disposed in the fluid, wherein the resin is at least partially disposed between the anode and the cathode.

17. The separation system of claim 16 wherein elution of the ion is assisted by an electrical field generated between the anode and the cathode.

18. The separation system of claim 14 wherein the fluid comprises a biological fluid and wherein the ion comprises at least one of a polynucleotide, a polypeptide, a charged lipid, and a charged carbohydrate.

19. The separation system of claim 14 wherein elution is further assisted by addition of a second ion to the ion exchange resin.

20. The separation system of claim 19 wherein the second ion is an anion.

AMENDED CLAIMS

[received by the International Bureau on 17 October 2002 (17.10.2002)]

1. A separation system comprising:

a cathode, an anode, and a first ion bound by a first ion exchange resin, wherein the first ion exchange resin is at least partially disposed between the cathode and the anode and separated from at least one of the anode and cathode by a charge mosaic membrane;

wherein the cathode, the anode, and the ion exchange resin are at least partially disposed in a medium; and

wherein the first ion is eluted from the resin using (a) a voltage that is applied between the anode and cathode and (b) a second ion that is generated by electrolysis of the medium.

2. The separation system of claim 1 wherein the first ion is an anion, the first ion exchange resin is an anion exchange resin that is separated from the cathode by the charge mosaic membrane, and wherein the second ion is a hydroxyl ion.

3. The separation system of claim 2 wherein the medium comprises water.

4. The separation system of claim 3 wherein the second ion reacts with an H^+ ion generated at the anode to form water.

5. The separation system of claim 1 further comprising a second ion exchange resin at least partially disposed between the anode and the first ion exchange resin.

6. The separation system of claim 5 further comprising a cation exchange membrane at least partially disposed between the first and second ion exchange resin.

7. The separation system of claim 6 wherein the charge mosaic membrane is at least partially disposed between the cathode and the first ion exchange resin.

8. A separation system comprising an ion exchange resin that binds an ion from a fluid, wherein the ion is eluted from the resin using (a) an electric field generated between an

cathode and a anode and (b) a second ion that is generated by electrolysis of the fluid by the cathode and the anode, and wherein a charge mosaic membrane separates the ion exchange resin from the cathode, thereby allowing migration of OH^- ions from the cathode to the ion exchange resin and migration of cations from the ion exchange resin to the cathode.

9. Canceled.

10. The separation system of claim 8 wherein elution of the ion from the fluid further comprises addition of a third ion.

11. The separation system of claim 8 wherein the ion exchange resin comprises an anion exchange resin, and wherein the ion is an anion.

12. The separation system of claim 8 wherein the fluid comprises a biological fluid and wherein the ion comprises at least one of a polynucleotide, a polypeptide, a charged lipid, and a charged carbohydrate.

13. The separation system of claim 8 further comprising a third ion that binds to the ion exchange resin, wherein the third ion elutes at an electric field and concentration of the second ion that is different from the elution of the ion from the fluid.

14. A separation system comprising a charge mosaic membrane that is coupled to an ion exchange resin wherein the resin binds an ion from a fluid and wherein the ion is eluted at least in part from the resin using an eluent that is generated by electrolysis of the fluid.

15. The separation system of claim 14 wherein the resin comprises an anion ion exchange resin, and wherein the eluent is an OH^- ion.

16. The separation system of claim 14 wherein electrolysis is performed by a current applied to an anode and a cathode, wherein the anode and the cathode are at least partially disposed in the fluid, wherein the resin is at least partially disposed between the anode and the cathode.

17. The separation system of claim 16 wherein elution of the ion is assisted by an electrical field generated between the anode and the cathode.

18. The separation system of claim 14 wherein the fluid comprises a biological fluid and wherein the ion comprises at least one of a polynucleotide, a polypeptide, a charged lipid, and a charged carbohydrate.

19. The separation system of claim 14 wherein elution is further assisted by addition of a second ion to the ion exchange resin.

20. The separation system of claim 19 wherein the second ion is an anion.